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Turkenitz et al.

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(54) **SELECTIVELY PURGING FLUID-JET PRINTHEAD OF PAGE-WIDE ARRAY FLUID-JET DEVICE**

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(51) **Int. Cl.**
B41J 2/165 (2006.01)

(52) **U.S. Cl.** **347/85**

(58) **Field of Classification Search** ..... None
See application file for complete search history.

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(57) **ABSTRACT**

An apparatus is to selectively purge a desired fluid-jet printhead of a number of fluid-jet printheads of a page-wide array fluid-jet device. The apparatus includes a purging insert movably locatable within a fluid channel of the page-wide array fluid-jet device. The fluid channel is to supply fluid to the fluid-jet printheads during normal operation of the page-wide array fluid-jet device. The apparatus includes a movement mechanism operatively coupled to the purging insert to move the purging insert within the fluid channel incident to the desired fluid-jet printhead. The apparatus includes a pressurizing mechanism fluidically coupled to the purging insert to pressurize fluid. The purging insert is to deliver the fluid as pressurized by the pressurizing mechanism to the desired fluid-jet printhead to purge the desired fluid-jet printhead.

15 Claims, 7 Drawing Sheets

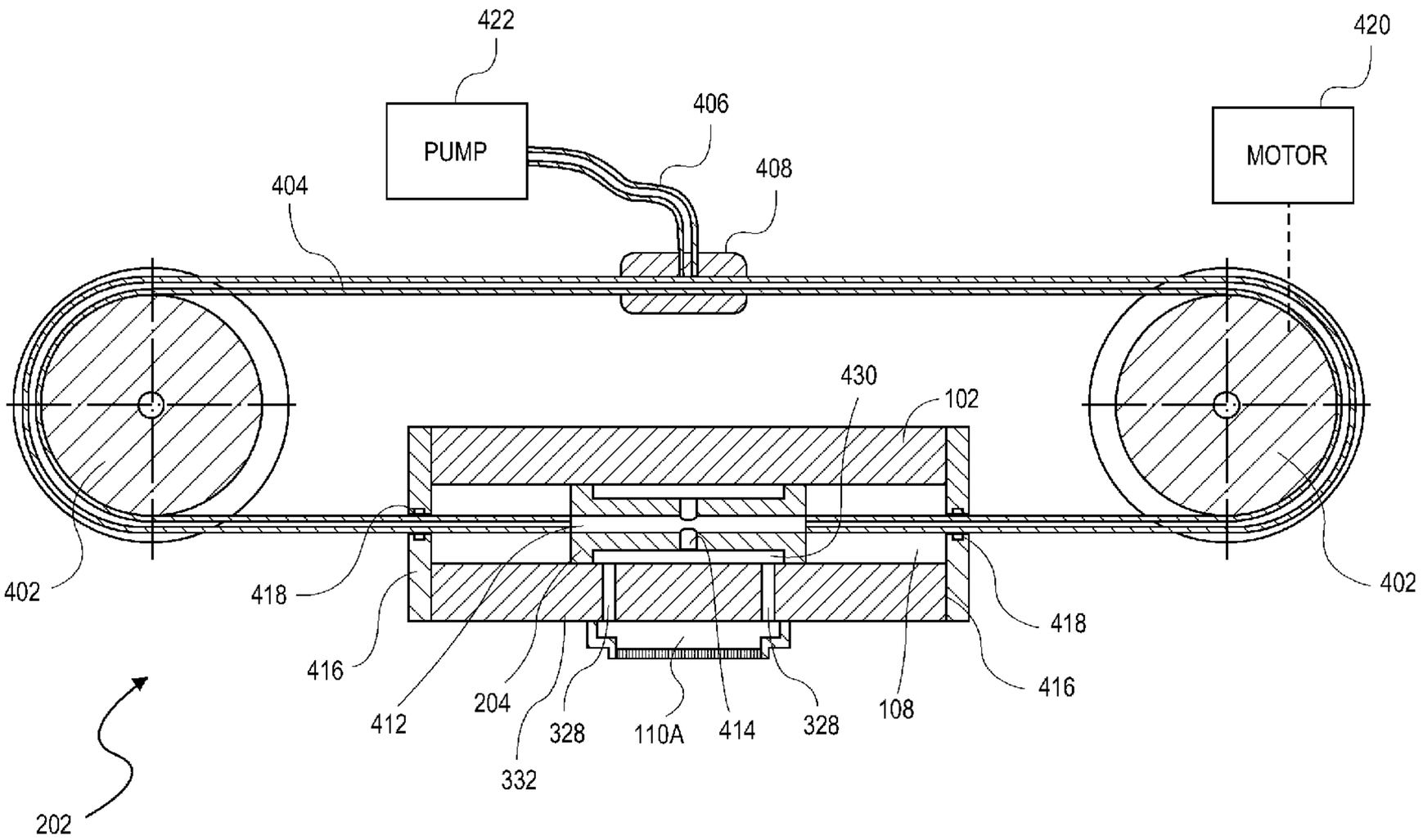


FIG. 1A

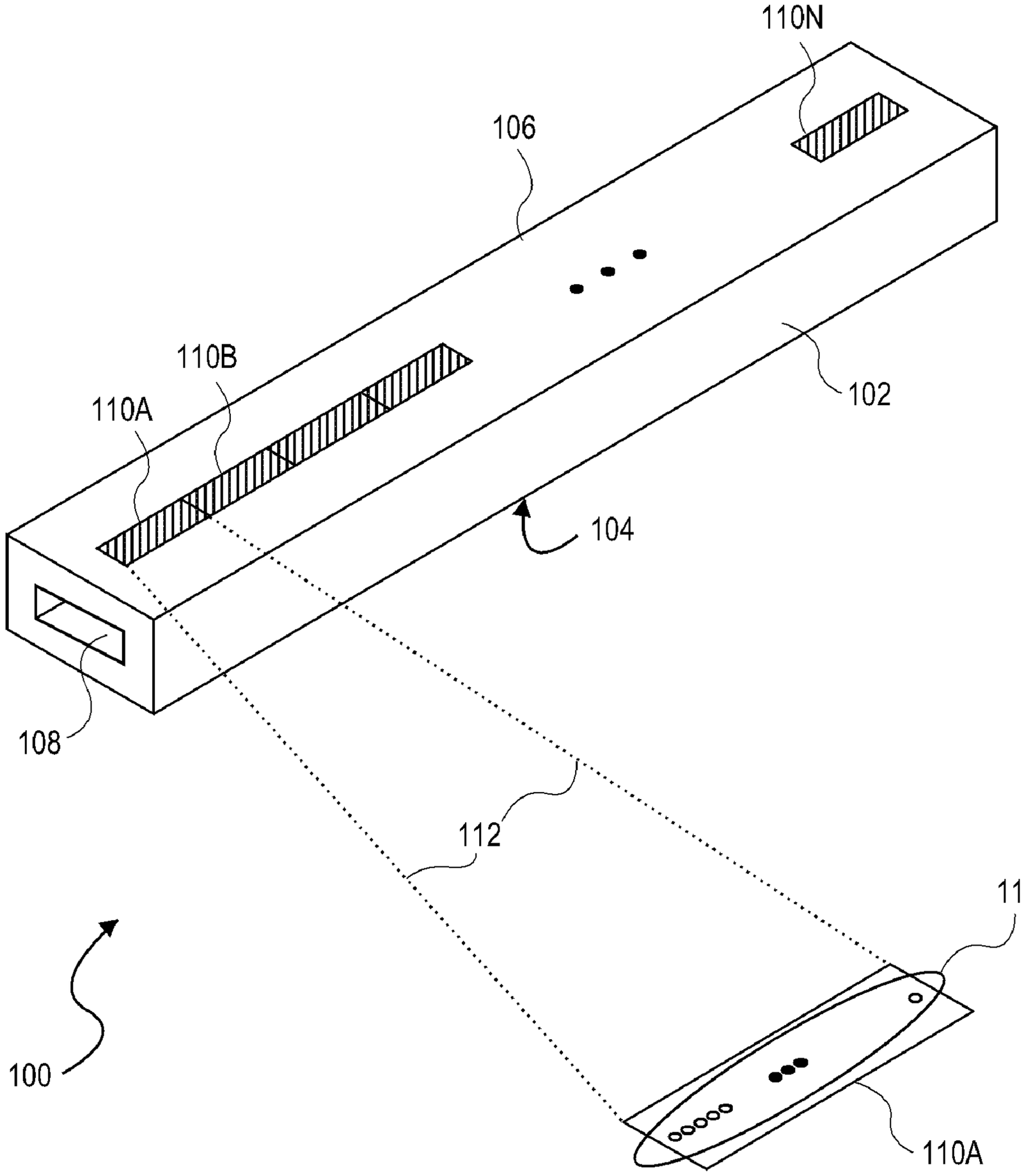


FIG. 1B

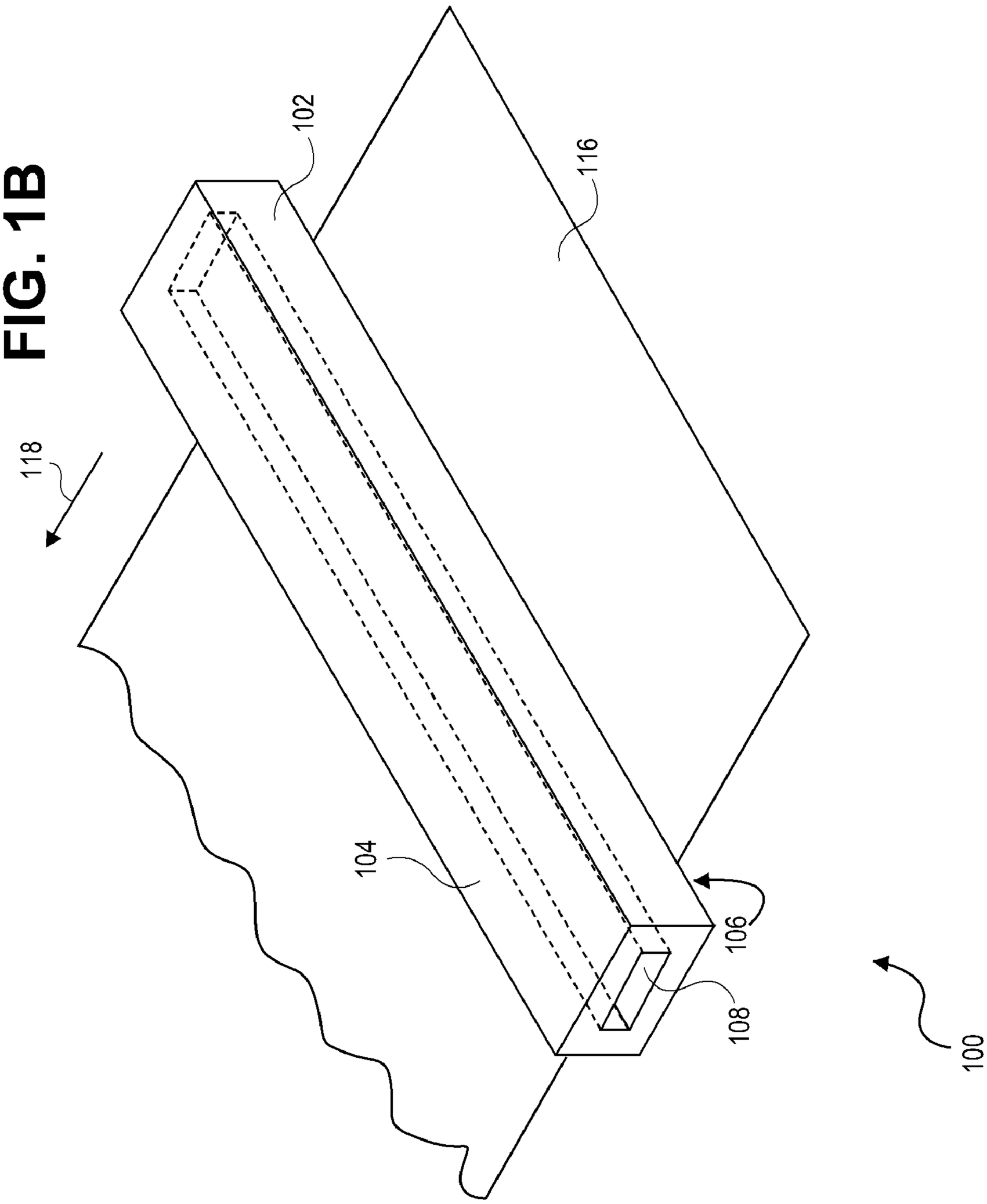


FIG. 2

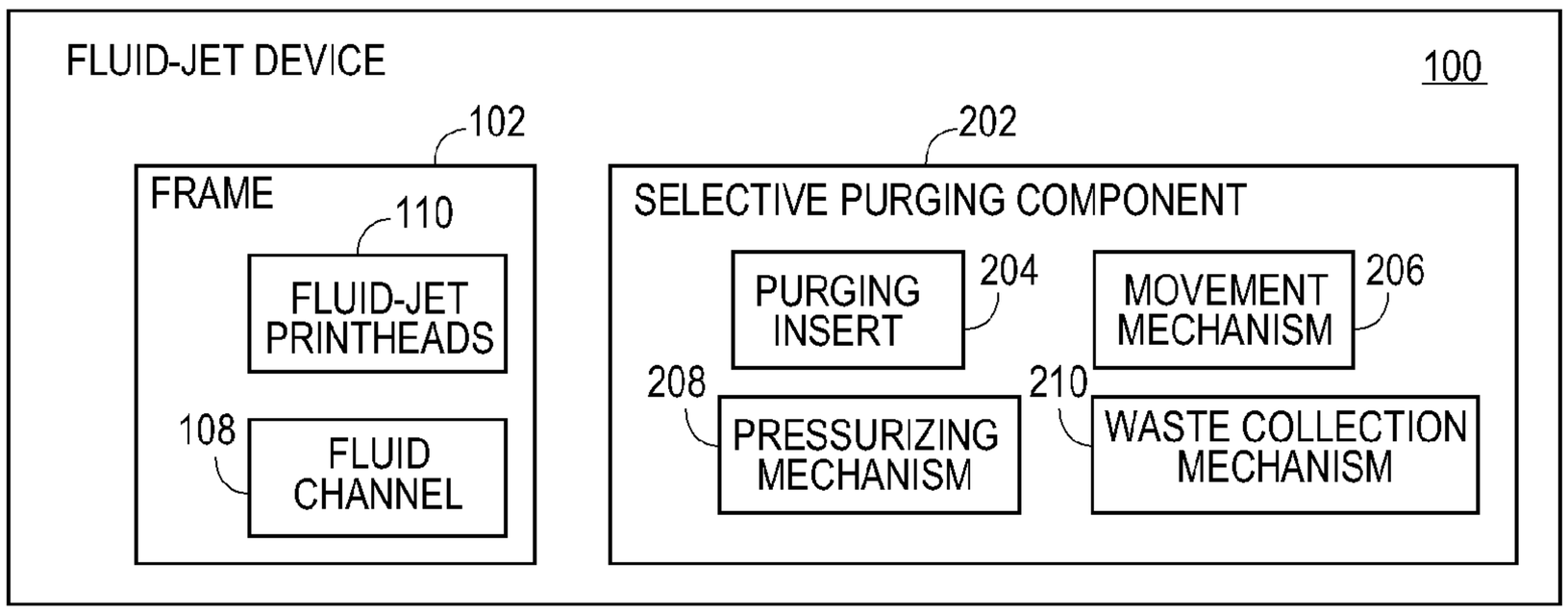
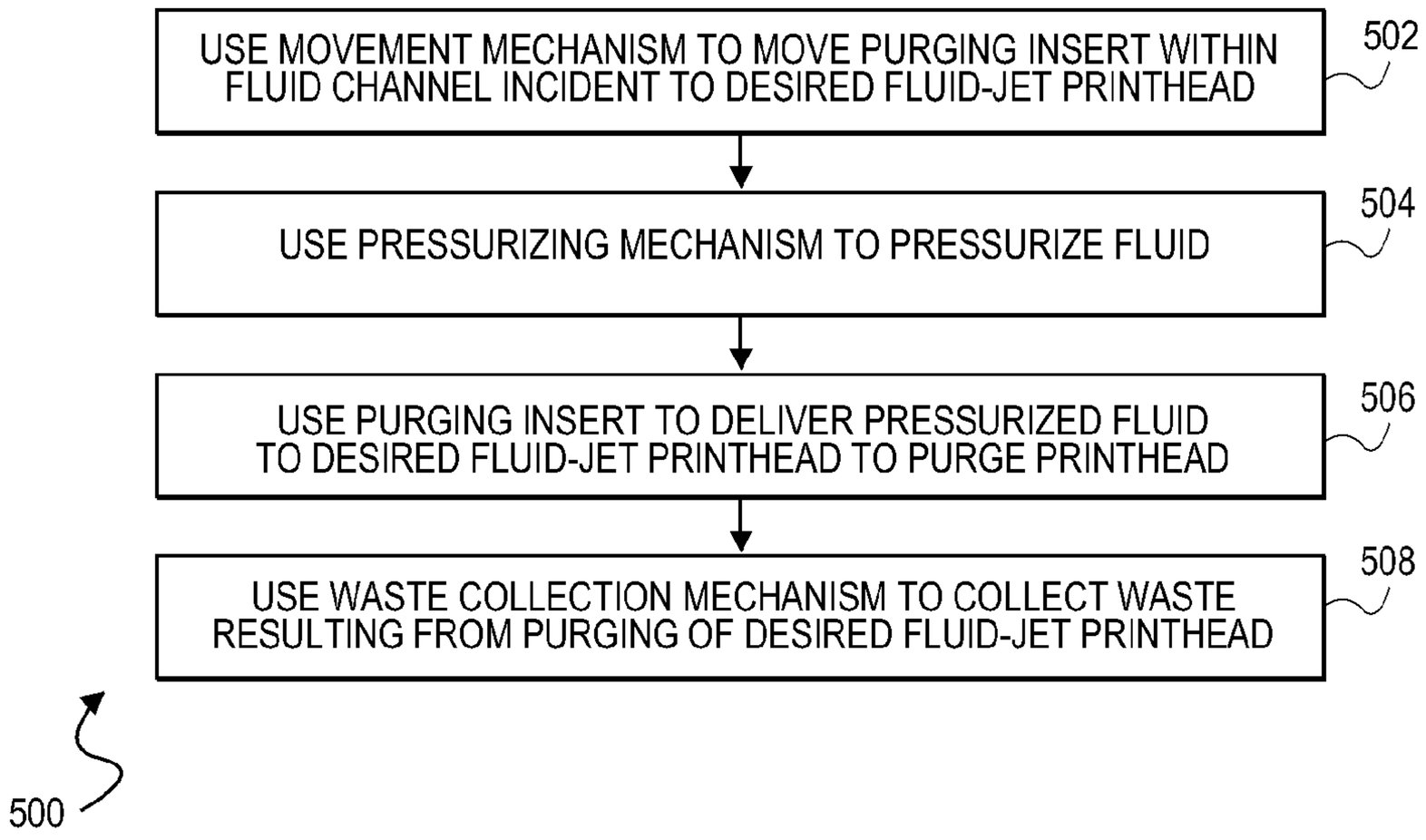

FLUID-JET DEVICE
100
102
FRAME
110
FLUID-JET PRINTHEADS
108
FLUID CHANNEL
202
SELECTIVE PURGING COMPONENT
PURGING INSERT
204
MOVEMENT MECHANISM
206
208
PRESSURIZING MECHANISM
210
WASTE COLLECTION MECHANISM

FIG. 5


USE MOVEMENT MECHANISM TO MOVE PURGING INSERT WITHIN FLUID CHANNEL INCIDENT TO DESIRED FLUID-JET PRINTHEAD
502
USE PRESSURIZING MECHANISM TO PRESSURIZE FLUID
504
USE PURGING INSERT TO DELIVER PRESSURIZED FLUID TO DESIRED FLUID-JET PRINTHEAD TO PURGE PRINTHEAD
506
USE WASTE COLLECTION MECHANISM TO COLLECT WASTE RESULTING FROM PURGING OF DESIRED FLUID-JET PRINTHEAD
508
500

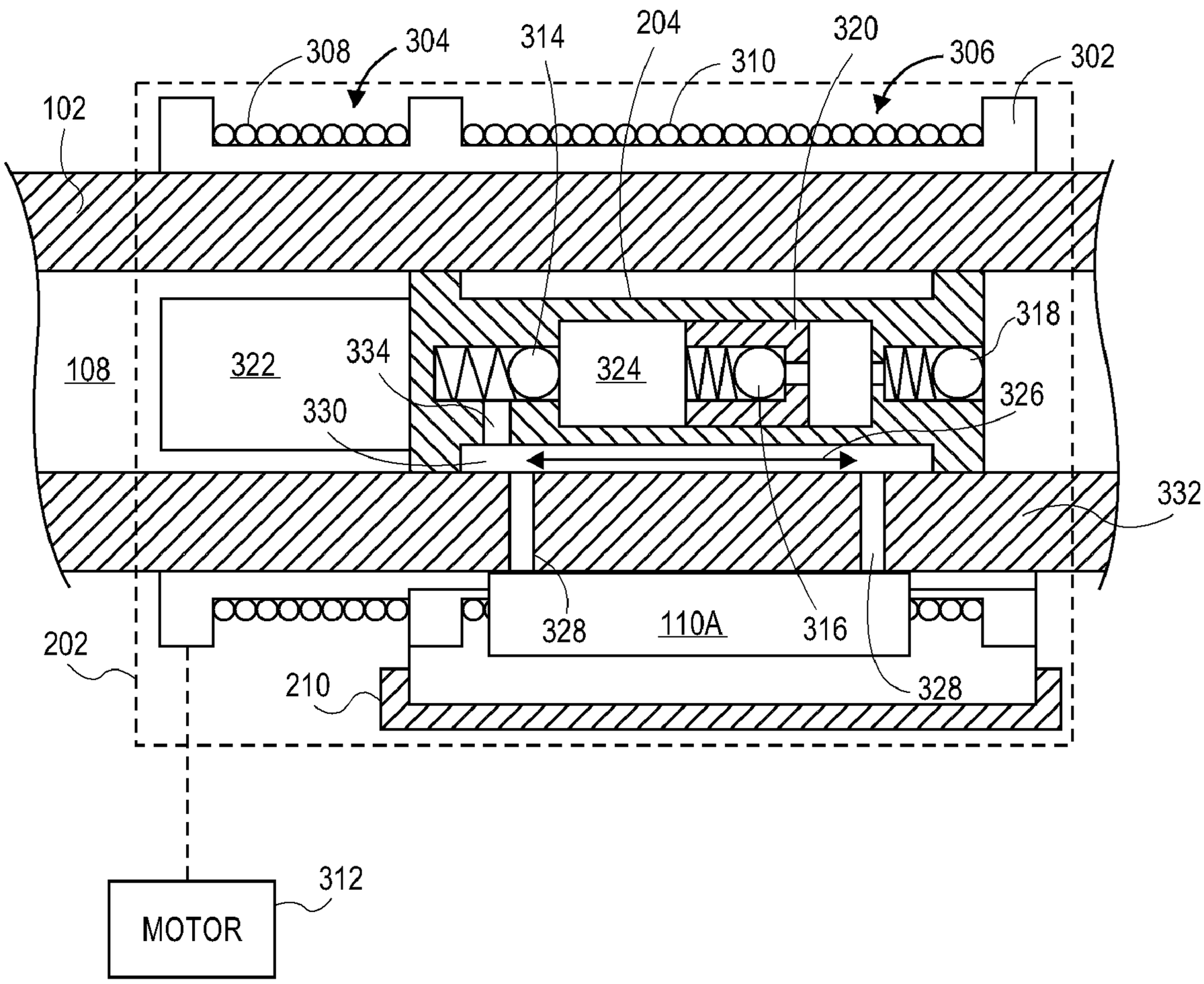

308
304
314
204
320
310
306
302
102
108
322
334
330
324
318
326
332
328
110A
316
328
202
210
312
MOTOR

FIG. 3A

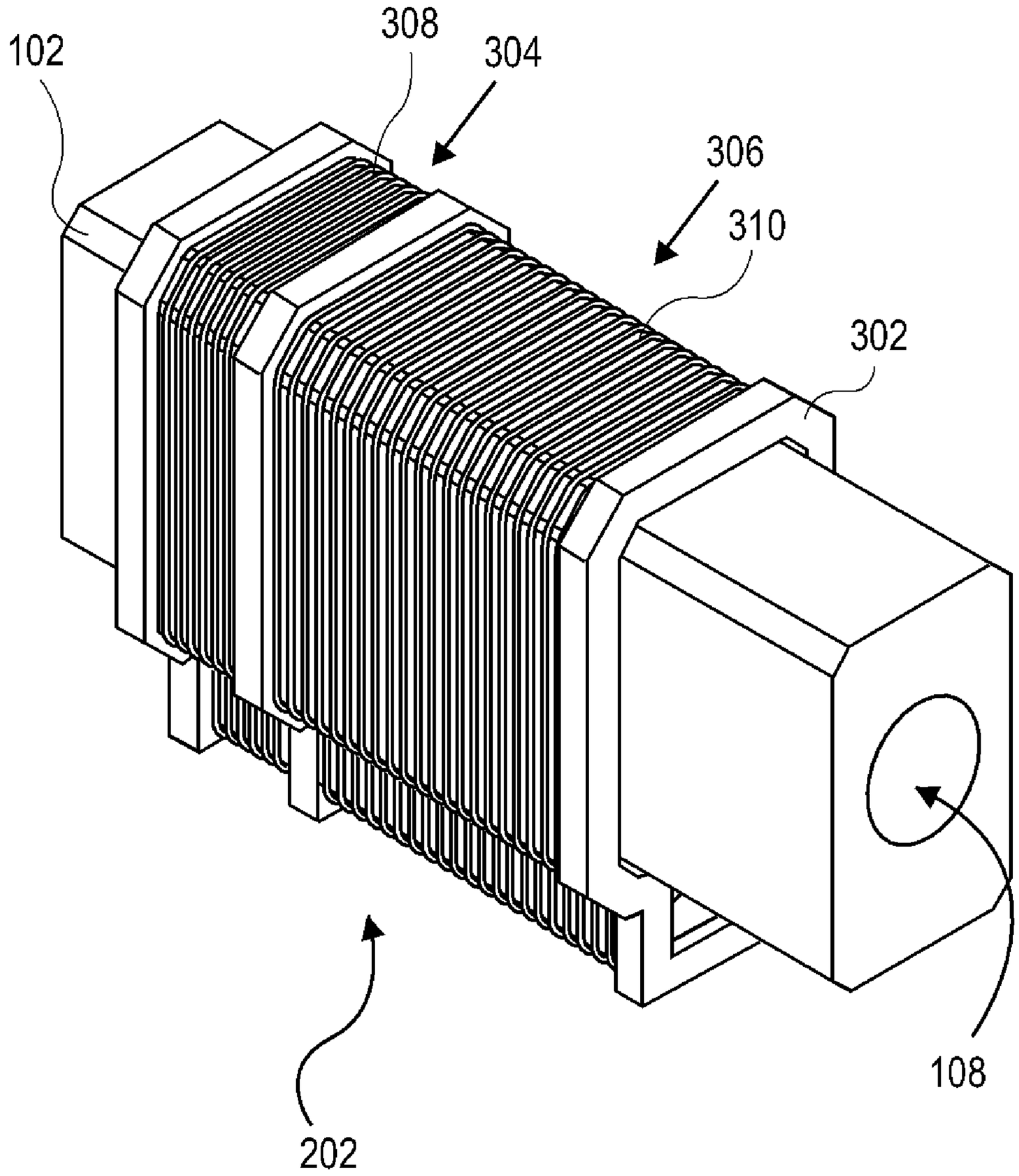
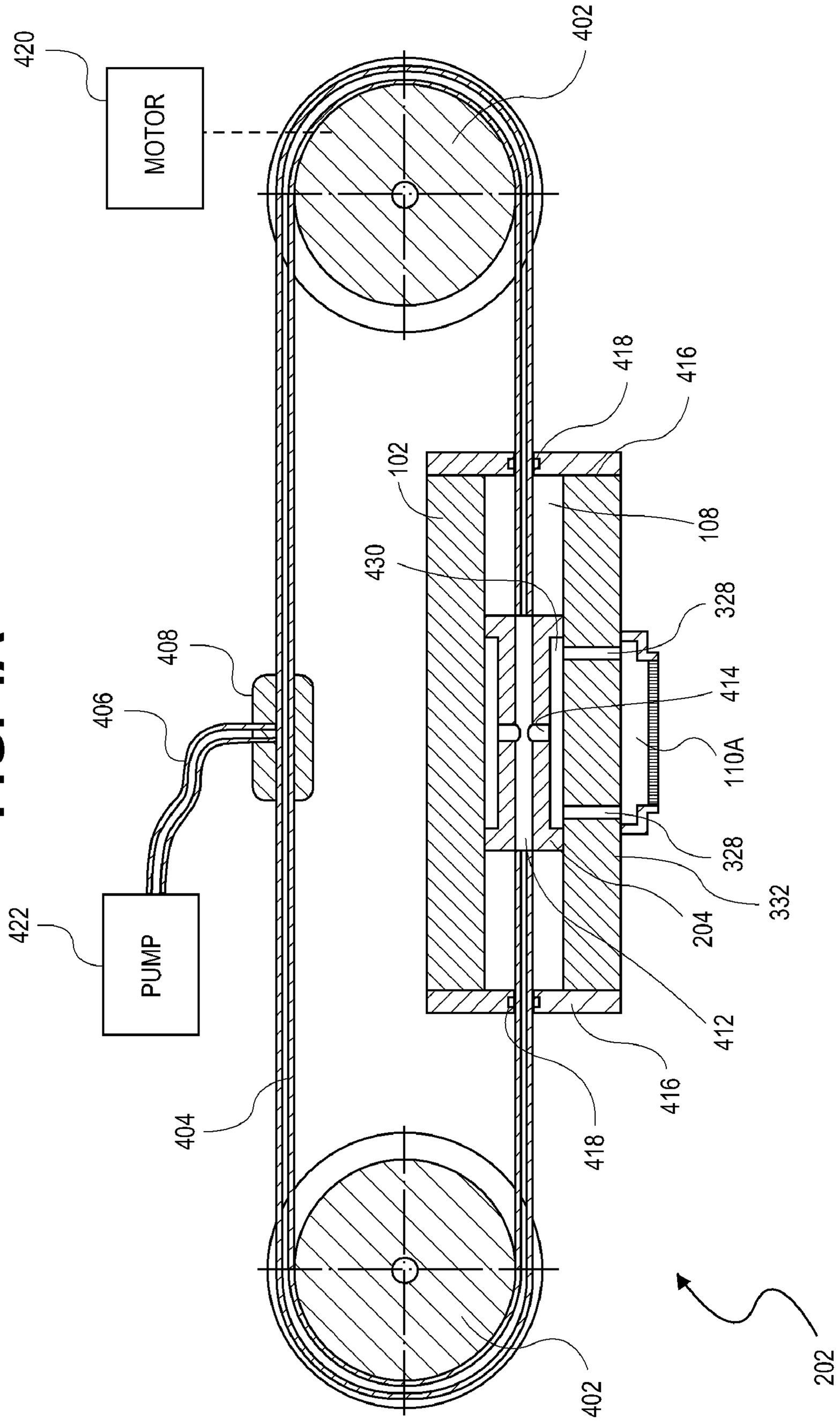


FIG. 3B

FIG. 4A


420
MOTOR
402
408
406
422
PUMP
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416
102
108
430
328
414
110A
328
204
332
412
416
418
402
202

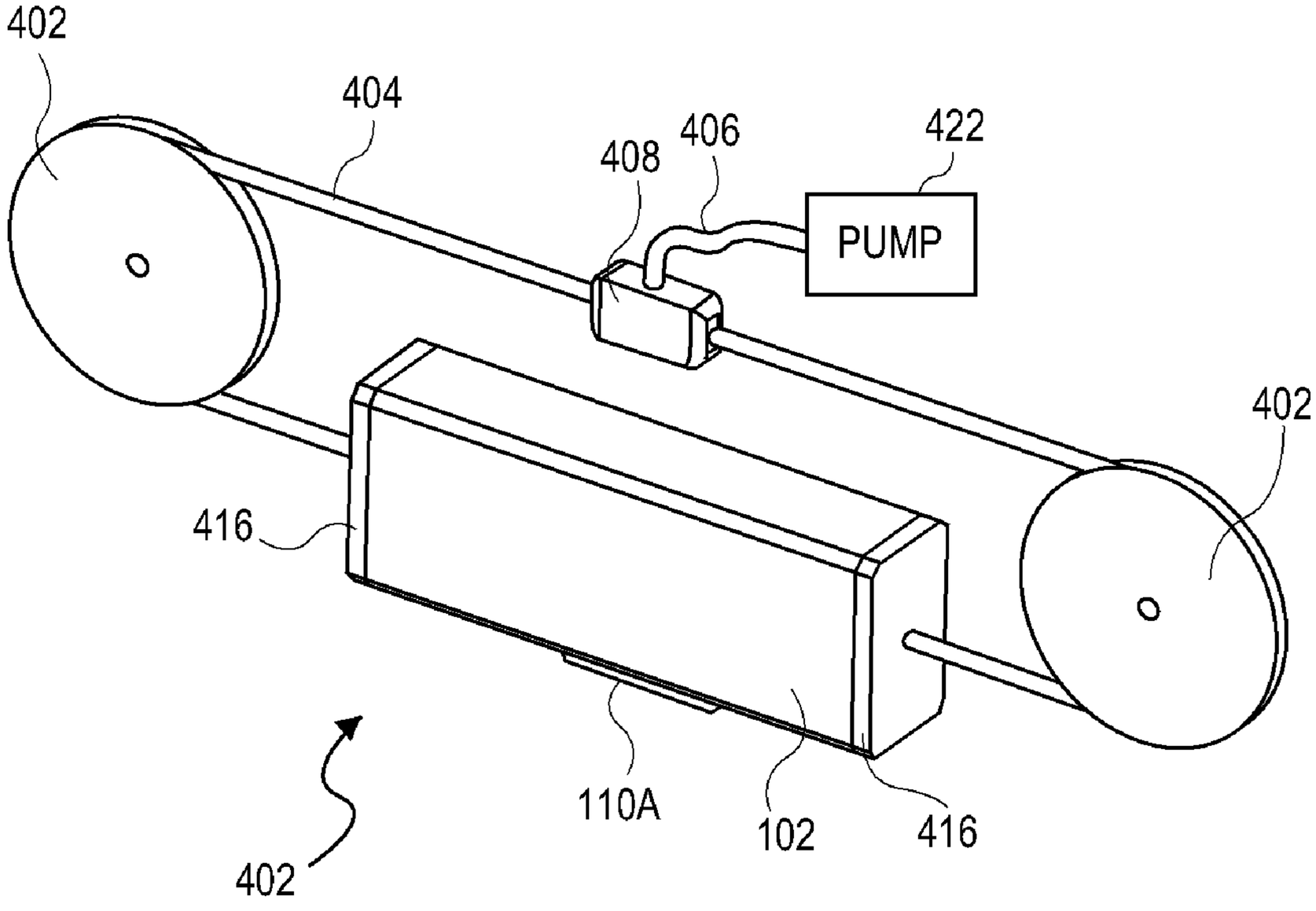

FIG. 4B

SELECTIVELY PURGING FLUID-JET PRINTHEAD OF PAGE-WIDE ARRAY FLUID-JET DEVICE

BACKGROUND

One type of inkjet-printing device, which is more generally referred to as a fluid-jet device, is a page-wide array inkjet-printing device. In this type of inkjet-printing device, a number of inkjet printheads, which are more generally referred to as fluid-jet printheads, are organized as an array at least substantially perpendicular to the direction of movement of media sheets through the device. The array is a page-wide array in that the printheads extend from one side or edge of the media sheets to the other side or edge of the media sheets. As such, the array is typically stationary during printing; as media sheets are moved past the array, the printheads eject ink onto the media sheets.

A page-wide array inkjet-printing device thus contrasts with another type of inkjet-printing device known as a scanning printhead inkjet-printing device. In the latter type of inkjet-printing device, a scanning inkjet printhead moves, or scans, along a section, or swath, of a media sheet from one side to the other side of the sheet, ejecting ink along this media sheet section as it moves over the section. When printing on the current swath has finished, the media sheet is advanced slightly so that a new swath is incident to the printhead, and the printhead scans over the new swath. This process is repeated until ink has been printed on the media sheet as desired.

In general, page-wide array inkjet-printing devices are typically faster than scanning printhead inkjet-printing devices, in that a complete media sheet can have ink printed thereon in a desired manner more quickly using the former type of inkjet-printing device as compared to the latter type of inkjet-printing device. However, all inkjet-printing devices and other types of fluid-ejection devices are usually susceptible to occasional clogging of printhead nozzles through which ink is actually ejected. Therefore, a purging operation may have to be periodically performed to forcibly clear the printhead nozzles so that they can continue to be used for printing purposes.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1**A and **1**B are diagrams of a page-wide array fluid-jet device, according to an embodiment of the present disclosure.

FIG. **2** is a block diagram of a page-wide array fluid-jet device having a selective purging component or apparatus, according to an embodiment of the present disclosure.

FIGS. **3**A and **3**B are a cross-sectional diagram and a perspective-view diagram, respectively, of a selective purging component or apparatus, according to an embodiment of the present disclosure.

FIGS. **4**A and **4**B are a cross-sectional diagram and a perspective-view diagram, respectively, of a selective purging component or apparatus, according to an embodiment of the present disclosure.

FIG. **5** is a flowchart of a method of use of a selective purging component or apparatus, according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

Overview of Problem and Solution

As has been noted in the background, fluid-jet printhead nozzles are susceptible to clogging. For instance, ink or other fluid may dry on the nozzles, plugging them up. As such, when the fluid-jet printhead of which these nozzles are a part is called upon to eject fluid, the printhead fails, because its nozzles are clogged. To clear the nozzles of such clogs, what is referred to as a purging operation is performed.

Purging can be generally achieved in a number of different ways. First, a wiping operation can be performed, in which a wiper or other type of wiping mechanism physically makes contact with and is moved back and forth over the clogged nozzles, removing the debris that is causing the clog. Second, a vacuuming operation can be performed, in which a vacuum or other type of suctioning mechanism is sealed around the clogged nozzles and turned on to vacuum or suction the debris that is causing the clog. Third, a purging operation can be performed in which fluid is forcibly ejected through the clogged nozzles to clear the debris that is causing the clog. In this type of purging, the fluid is ejected more forcibly than is achieved during normal ejecting operations to eject fluid in a desired manner, such as to print a desired image on a media sheet. This type of purging may be referred to as spitting.

Embodiments of the present disclosure are concerned with the latter type of purging, specifically in relation to page-wide array fluid-jet devices, such as page-wide array inkjet-printing devices. Forcibly ejecting fluid from page-wide array fluid-jet devices is typically difficult if not near impossible to accomplish without wasting significant amounts of fluid. This is because a page-wide array fluid-jet device has a relatively large number of fluid-jet printheads, and thus a relatively large number of fluid-jet nozzles. Purging all the nozzles of all the fluid-jet printheads may clear the nozzles that are clogged, but at the cost of wasting fluid by forcibly ejecting fluid through the nozzles of the typically larger in number printheads that are not clogged.

By comparison, forcibly ejecting fluid from a scanning head fluid-jet device, such as a scanning printhead inkjet-printing device, is relatively easy to achieve without wasting significant amounts of fluid. This is because there are relatively few printheads within such a scanning head fluid-jet device. Indeed, there may just be a single printhead within a scanning head fluid-jet device. Therefore, forcibly ejecting fluid through all the nozzles of all the fluid-jet printheads in this instance does not incur the cost of wasting significant fluid, because there are not that many printheads to begin with in a scanning head fluid-jet device.

Embodiments of the present disclosure overcome the disadvantages associated with forcibly ejecting fluid to purge clogged fluid-jet printheads of a page-wide array fluid-jet device by selectively purging the nozzles of just a given printhead of the device. As such, fluid is not wasted, because just a selected fluid-jet printhead has fluid forcibly ejected through its nozzles, and thus fluid is not forcibly ejected through the nozzles of all the fluid-jet printheads of a page-wide array fluid-jet device to clear the nozzles of just one printhead. As used herein, a clogged fluid-jet printhead refers to such a printhead that has one or more of its nozzles clogged. Furthermore, purging a given fluid-jet printhead refers to purging the nozzles of such a printhead.

Basic Page-Wide Array Fluid-Jet Device and General Selective Purging Solution

FIGS. **1**A and **1**B show a rudimentary page-wide array fluid-jet device **100**, according to an embodiment of the present disclosure. The fluid-jet device **100** may be an inkjet-

printing device, which is a device, such as a printer, that ejects ink onto media sheets, such as paper, to form images, which can include text, on the media sheets. The fluid-jet device **100** is more generally a fluid-jet precision-dispensing device that precisely dispenses fluid, such as ink. The fluid-jet device **100** may eject pigment-based ink, dye-based ink, another type of ink, or another type of fluid. Embodiments of the present disclosure can thus pertain to any type of fluid-jet precision-dispensing device that dispenses a substantially liquid fluid.

A fluid-jet precision-dispensing device is therefore a drop-on-demand device in which printing, or dispensing, of the substantially liquid fluid in question is achieved by precisely printing or dispensing in accurately specified locations, with or without making a particular image on that which is being printed or dispensed on. As such, a fluid-jet precision-dispensing device is in comparison to a continuous precision-dispensing device, in which a substantially liquid fluid is continuously dispensed therefrom. An example of a continuous precision-dispensing device is a continuous inkjet-printing device.

The fluid-jet precision-dispensing device precisely prints or dispenses a substantially liquid fluid in that the latter is not substantially or primarily composed of gases such as air. Examples of such substantially liquid fluids include inks in the case of inkjet-printing devices. Other examples of substantially liquid fluids include drugs, cellular products, organisms, fuel, and so on, which are not substantially or primarily composed of gases such as air and other types of gases, as can be appreciated by those of ordinary skill within the art.

The fluid-jet device **100** includes a frame **102** that nominally extends over the entire width of a media sheet **116**. As such, the fluid-jet device **100** is specifically a page-wide array fluid-jet device, as opposed to a scanning head fluid-jet device like a scanning printhead inkjet-printing device as has been described above. The frame **102** has surfaces **104** and **106** opposite to one another. A fluid channel **108** extends within the frame **102** parallel to and between the surfaces **104** and **106**.

A number of fluid-jet printheads **110**A, **110**B, . . . , **110**N, collectively referred to as the fluid-jet printheads **110**, are disposed on the surface **106** of the frame **102** of the fluid-jet device **100**. The fluid-jet printheads **110** are positioned on the surface **106** so that the entire width of the media sheet **116** is covered by the printheads **110**. Each of the fluid-jet printheads **110** includes a number of fluid-ejection nozzles. For instance, in FIG. **1**A, the fluid-jet printhead **110**A is depicted in exemplary detail as including a number of fluid-ejection nozzles **114**.

In normal operation of the fluid-jet device **100**, fluid such as ink is supplied to the fluid-jet printheads **110** via the fluid channel **108**. The nozzles of the fluid-jet printheads **110** selectively eject fluid drops onto the media sheet **116** as the media sheet **116** moves past the frame **102** in a direction perpendicular to the frame **102**, as indicated by the arrow **118**. In this way, for instance, an image may be printed on the media sheet **116** using ink ejected by the printheads **110**. Thus, typically the frame **102** and therefore the fluid-jet printheads **110** remain stationary during fluid ejection by the fluid-jet device **100**. In this respect, the page-wide array fluid-jet device **100** is also distinguished from a scanning head fluid-jet device, in which a printhead is moved, or scanned, during fluid ejection by the device.

FIG. **2** shows a block diagram of the fluid-jet device **100**, according to an embodiment of the present disclosure, in relation to which a general selective printhead purging solution is described. The fluid-jet device **100** in FIG. **2** is depicted as including the frame **102** having the fluid channel **108** and the fluid-jet printheads **110**, as well as including a selective purging component, or apparatus, **202**. The fluid-jet device **100** can and typically does include other components, in addition and/or in lieu of the frame **102**, the printheads **110**, and the selective purging component **202**. For example, there can be more than one fluid channel **108**, corresponding to the different colors of ink, for instance, where the fluid-jet device **100** is an inkjet-printing device.

The selective purging component **202** selectively purges a desired fluid-jet printhead of the fluid-jet printheads **110**. As such, the selective purging component **202** is able to forcibly eject fluid through the fluid-ejection nozzles of a selected fluid-jet printhead, instead of through the fluid-ejection nozzles of all the fluid-jet printheads **110** of the fluid-jet device **100**. The purging component **202** includes a purging insert **204**, a movement mechanism **206**, and a pressurizing mechanism **208**, and may further include a waste collection mechanism **210**. The insert **204** and the mechanisms **206**, **208**, and **210** are now described in a general manner. Thereafter, in subsequent sections of the detailed description, specific implementations embodying the selective purging component **202** are described.

The purging insert **204** is movably located within the fluid channel **108**. The movement mechanism **206** is operatively coupled to the purging insert **204**, and moves the purging insert **204** within the fluid channel **108** so that the purging insert **204** becomes incident to a desired fluid-jet printhead of the fluid-jet printheads **110** for purging purposes. The pressurizing mechanism **208** is fluidically coupled to the purging insert **204**, and pressurizes fluid that is then delivered by the purging insert **204** to the desired fluid-jet printhead to purge this desired printhead.

In this manner, selective purging of just a desired fluid-jet printhead is achieved. Rather than forcibly ejecting fluid through all the fluid-jet printheads **110** of the fluid-jet device, fluid is forcibly ejected through just a desired fluid-jet printhead. This is accomplished by the movement mechanism **206** moving the purging insert **204** within the fluid channel **108** so that the insert **204** is incident to the desired printhead, and the pressurizing mechanism **208** pressurizing fluid that is then delivered by the insert **204** to the desired printhead for purging purposes. As noted above, specific embodiments of the insert **204** and the mechanisms **206** and **208** are described in subsequent sections of the detailed description.

It is further noted the waste collection mechanism **210** may also be movably disposed over the exterior of the fluid channel **108** (i.e., opposite the printheads **110** and below the surface **106** in FIG. **1**B) to collect the waste resulting from purging of the printhead. Such waste typically includes the debris that is clogging the fluid-ejection nozzles of the fluid-jet printhead in question, and that is forcibly ejected from the nozzles during purging. The movement mechanism **206** in such instance can be operatively coupled to the waste collection mechanism **210** to also move the waste collection mechanism **210** over the exterior of the fluid channel **108** so that the mechanism **210** is incident to the fluid-jet printhead being purged.

First Specific Embodiment of Selective Purging Component or Apparatus

FIGS. **3**A and **3**B show a cross-sectional view and a perspective view, respectively, of the selective purging component **202**, according to an embodiment of the disclosure. The selective purging component **202** includes the purging insert **204** that is movably locatable within the fluid channel **108** defined by the frame **102** of the fluid-jet device **100** that has been described. It is noted that the fluid channel **108** is depicted in FIG. **3**B specifically as being round, whereas the

fluid channel **108** has been depicted in FIGS. **1**A and **1**B as being rectangular for convenience.

The selective purging component **202** further includes the movement mechanism **206** of FIG. **2** as specifically encompassing a carriage section **304** of a carriage **302**, a ferromagnetic member **322**, and a direct current (DC) coil **308**. It is noted, however, that the movement mechanism **206** is not specifically called out in FIGS. **3**A and **3**B apart from its constituent parts. The movement mechanism **206** may also include a motor **312**. The selective purging component **202** further includes the pressurizing mechanism **208** of FIG. **2** as specifically encompassing a cavity **324**, inlet valves **316** and **318**, a piston **320**, an outlet valve **314**, a carriage section **306** of the carriage **302**, and an alternating current (AC) coil **310**. Here, too, it is noted that the pressurizing mechanism **208** is not specifically called out in FIGS. **3**A and **3**B apart from its constituent parts. The selective purging component **202** may also include the waste collection mechanism **210**.

With respect to the movement mechanism **206**, the carriage section **304** is movably disposed on the exterior of the fluid channel **108** (i.e., on the frame **102**). That is, the carriage **302**, including the carriage section **304** of the movement mechanism **206** and the carriage section **306** of the pressurizing mechanism **208**, is movable along the frame **102**. The ferromagnetic member **322** is attached to the purging insert **204** and is movably disposed within the fluid channel **108** incident to the carriage section **304**. The DC coil **308** is wound around the carriage section **304**.

Upon powering of the DC coil **308** using a DC power source (not depicted in FIGS. **3**A and **3**B), the DC coil **308** becomes inductively coupled to the ferromagnetic member **322**. As such, movement of the carriage **302** and thus the carriage section **304** over the exterior of the fluid channel **108** (i.e., over the frame **102**) causes corresponding movement of the ferromagnetic member **322** and thus the purging insert **204** within the fluid channel **108**. The carriage **302** may be manually moved in this respect, or the motor **312** may be used in one embodiment.

With respect to the pressurizing mechanism **208**, the inlet valves **316** and **318** fluidically couple the fluid channel **108** to or with the cavity **324** to move fluid from the fluid channel **108** to the cavity **324**. The piston **320** pressurizes the fluid within the cavity **324**. The outlet valve **314** fluidically couples the cavity **324** to the desired fluid-jet printhead **110**A to move the fluid as pressurized within the cavity **324** to the printhead **110**A. The carriage section **306** of the carriage **302** is movably disposed on the exterior of the fluid channel **108** (i.e., on the frame **102**). The AC coil **310** is wound around the carriage section **306**, and is electromagnetically coupled to the piston **320**. The piston **320** pressurizes the fluid within the cavity **324** generally as follows. Upon powering of the AC coil **310** using an AC power source (not depicted in FIGS. **3**A and **3**B), the piston **320** oscillates within the cavity **324** due to its being electromagnetically coupled to the AC coil **310**, as indicated by the bidirectional arrow **326**, to pressurize the fluid within the cavity **324**.

More specifically, in particular relation to FIG. **3**A, when the piston **320** moves to the right, the inlet valves **316** and **318** open to permit the fluid within the fluid channel **108** to enter the cavity **324**. When the piston **320** moves to the left, the inlet valves **316** and **318** close and the fluid within the cavity **324** is pressurized. Alternatively, the inlet valves **316** and **318** may be one-way valves that permit fluid to travel just from the fluid channel to the cavity **324**, and remain open while the piston **320** moves to the left and to the right. During pressurization, the outlet valve **314** remains closed. Once the fluid within the cavity **324** has been pressurized, the outlet valve **314** is opened.

With respect to the purging insert **204**, the purging insert **204** includes a cavity **330** that is fluidically coupled to the outlet valve **314**. The terminology fluidically coupled means the following. When a first element is said to be fluidically coupled to a second element, this means that fluid is permitted to flow from the first element to the second element. When a third element is said to fluidically couple a first element with a second element, this means that the third element permits fluid to flow from the first element to the second element.

It is noted that the fluid channel **108** is separated from the desired fluid-jet printhead **110**A by a wall **332** of the frame **102**. The wall **332** includes one or more secondary channels **328** that fluidically couple the fluid channel **108** to the desired fluid-jet printhead **110**A. Thus, the movement mechanism **206** moves the purging insert **204** within the fluid channel **108** so that the insert **204** is incident to the desired fluid-jet printhead **110**A. As such, the cavity **330** of the purging insert **204** is fluidically coupled to the desired fluid-jet printhead **110**A via the secondary channels **328**.

Therefore, after the movement mechanism **206** has appropriately moved the purging insert **204** and the pressurizing mechanism **208** has pressurized fluid within the cavity **324**, opening of the outlet valve **314** causes the pressurized fluid to be released to the cavity **330** through a secondary channel **334**, and thus to the fluid-jet printhead **110**A through the secondary channels **328**. Because the fluid is pressurized, it causes any debris clogging the fluid-jet nozzles of the fluid-jet printhead **110**A to be forcibly removed into the waste collection mechanism **210**. In this way, the selective purging component **202** of FIGS. **3**A and **3**B purges just the desired fluid-jet printhead **110**A.

As has been noted above, the waste collection mechanism **210** collects waste resulting from purging of the fluid-jet printhead **110**A. In this respect, the movement mechanism **206** is operatively coupled to the waste collection mechanism **210** to move the mechanism **210** over the exterior of the fluid channel **108** (i.e., over the frame **102**) so that the mechanism **210** is incident to desired fluid-jet printhead **110**A. The waste collection mechanism **210** is attached to the carriage section **306** of the carriage **302**, and therefore is incident to and specifically below the fluid-jet printhead **110**A when the purging insert **204** is incident to and specifically above the printhead **110**A.

In summary, then, the movement mechanism **206** of FIGS. **3**A and **3**B moves the purging insert **204** so that it is incident to the desired fluid-jet printhead **110**A. This is achieved by powering the DC coil **308** wound around the carriage section **304** so that the ferromagnetic member **322** that is attached to the purging insert **204** is inductively coupled to the DC coil **308**. Thus, subsequent movement of the carriage **302**, either manually or by the motor **312**, over the frame **102** results in corresponding movement of the purging insert within the fluid channel **108**.

Once the purging insert **204** has been moved incident to the desired fluid-jet printhead **110**A, the AC coil **310** wound around the carriage section **306** is powered to oscillate the piston **320**. Fluid moving from the fluid channel **108** to the cavity **324** via the inlet valves **316** and **318** is pressurized by the piston **320** within the cavity **324**. Once the fluid within the cavity **324** has been pressurized, the outlet valve **314** is opened, and the pressurized fluid travels to and is forcibly ejected by the fluid-jet printhead **110**A to purge the printhead **110**A. Waste, such as the debris that was clogging the fluid-jet

printhead **110**A and the fluid used to purge the printhead **110**A, is collected by the waste collection mechanism **210**.

It is noted that in the embodiment of FIGS. **3**A and **3**B, the movement mechanism **206** is operably coupled to the purging insert **204**, in that operation (i.e., movement) of the movement mechanism **206** results in movement of the purging insert **204**. The movement mechanism **206** is physically coupled to the purging insert **204** in that the ferromagnetic member **322** is attached to the insert **204**. Furthermore, in the embodiment of FIGS. **3**A and **3**B, the pressurizing mechanism **208** is partially disposed within the purging insert **204**. That is, the cavity **324**, the inlet valves **316** and **318**, the piston **320**, and the outlet valve **314** of the pressurizing mechanism **208** are all disposed within the purging insert **204**. By comparison, the carriage section **306** of the carriage **302** and the AC coil **310** of the pressurizing mechanism **208** are not disposed within the purging insert **204**.

Second Specific Embodiment of Selective Purging Component or Apparatus

FIGS. **4**A and **4**B show a cross-sectional view and a perspective view, respectively, of the selective purging component **202**, according to another embodiment of the disclosure. The selective purging component **202** includes the purging insert **204** that is movably locatable within the fluid channel **108** defined by the frame **102** of the fluid-jet device **100** that has been described. The selective purging component **202** further includes the movement mechanism **206** of FIG. **2** as specifically encompassing rotatable pulley wheels **402** and flexible hollow tubing **404**, and which also may include a motor **420**. It is noted that the movement mechanism **206** is not specifically called out in FIGS. **4**A and **4**B apart from its constituent parts, however.

The selective purging component **202** also includes the pressurizing mechanism **208** of FIG. **2** as specifically encompassing a pump **422**, and flexible hollow tubing **406**. Here, again, the pressurizing mechanism **208** is not specifically called out in FIGS. **4**A and **4**B apart from its constituent components. The selective purging component **202** may include the waste collection mechanism **210** that has been described, but it is not shown in FIGS. **4**A and **4**B.

With respect to the movement mechanism **206**, the flexible hollow tubing **404** is disposed around the rotatable pulley wheels **402** and is fixably attached to and fluidically coupled to the purging insert **204** within the fluid channel **108**. Rotation of the rotatable pulley wheels **402** causes the flexible hollow tubing **404** disposed around the pulley wheels **402** to move, which results in movement of the purging insert within the fluid channel **108**. In this respect, the flexible hollow tubing **404** serves as a pulley belt. The pulley wheels **402** may be manually rotated, or may be rotated using the motor **420**. It is noted in FIGS. **4**A and **4**B, the frame **102** is depicted as being relatively short for illustrative clarity and convenience. Furthermore, the frame **102** has on either end a sealing flange **416** that fluidically seals the ink channel **108** around a passage **418** through which the flexible hollow tubing **404** passes.

With respect to the movement mechanism **206**, the flexible hollow tubing **406** is fluidically couples the pump **422** with the purging insert **204** via the fluidic coupler **408** fluidically coupling the flexible hollowing tube **406** to the flexible hollow tubing **404**. When the rotatable pulley wheels **402** are rotated to move the flexible hollow tubing **404**, the fluidic coupler **408** correspondingly moves as well. The pump **422** pressurizes the fluid, and the pressurized fluid is delivered from the pump **422** to the purging insert **204** via the flexible hollow tubings **406** and **404**.

With respect to the purging insert **204**, the purging insert again includes the cavity **330** that has been described, and also includes a cavity **412** and one or more secondary channels **414**. The fluid channel **108** is also again separated from the desired fluid-jet printhead **110**A by the wall **332** of the frame **102**, where the wall includes the secondary channels **328** that fluidically coupled the fluid channel **108** to the desired fluid-jet printhead **110**A. The secondary channels **414** fluidically coupling the cavity **412** of the purging insert **204** to the cavity **330** of the insert **204**. The cavity **412** of the purging insert **204** is itself fluidically coupled to the flexible hollow tubing **404**. Thus, the movement mechanism **206** moves the purging insert **204** within the fluid channel **108** so that the insert **204** is incident to the desired fluid-jet printhead **110**A. As such, the cavity **330** of the purging insert **204** is resultantly fluidically coupled to the desired printhead **110**A via the secondary channels **328**.

Therefore, after the movement mechanism **206** has appropriately moved the purging insert **204** and the pressurizing mechanism **208** has pressurized fluid, the pressurized fluid is delivered via the flexible hollow tubings **406** and **404** to the cavity **412** of the purging insert **204**. From the cavity **412**, the pressurized fluid travels through the secondary channels **414** to the cavity **330** of the purging **204**, from which the pressurized fluid travels to the fluid-jet printhead **110**A via the secondary channels **328**. Because the fluid is pressurized, it causes any debris clogging the fluid-jet nozzles of the fluid-jet printhead **110**A to be forcibly removed, and into the waste collection mechanism **210** if present. In this way, the selective purging component **202** of FIGS. **4**A and **4**B purges just the desired fluid-jet printhead **110**A.

In summary, then, the movement mechanism **206** of FIGS. **4**A and **4**B moves the purging insert **204** so that it is incident to the desired fluid-jet printhead **110**A. The pump **422** pressurizes fluid, which travels via the flexible hollow tubings **406** and **404** to the purging insert **204**. Via the cavities **412** and **330** and the secondary channels **414** and **328**, the pressurized fluid travels to and is forcibly ejected by the fluid-jet printhead **110**A to purge the printhead **110**A.

It is noted that in the embodiment of FIGS. **4**A and **4**B, the movement mechanism **206** is operably coupled to the purging insert **204**, in that operation of the movement mechanism **206** results in movement of the purging insert **204**. The movement mechanism **206** is physically and fluidically coupled to the purging insert **204** in that the flexible hollow tubing **404** is physically and fluidically attached to the insert **204**. Furthermore, in the embodiment of FIGS. **4**A and **4**B, no part of the pressurizing mechanism **208** is disposed within the purging insert **204**. For instance, the pump **422**, the flexible hollow tubing **406**, and the fluidic coupler **408** are all disposed outside the purging insert **204**.

Concluding Method of Use

In conclusion, FIG. **5** shows a method **500** for using the selective purging component **202**, according to an embodiment of the disclosure. The movement mechanism **206** is used to move the purging insert **204** within the fluid channel **108** to a desired fluid-jet printhead (**502**). This may be achieved as has been described in relation to FIGS. **3**A and **3**B, or as has been described in relation to FIGS. **4**A and **4**B, for instance. The pressurizing mechanism **208** is then used to pressurize fluid (**504**). This may also be achieved as has been described in relation to FIGS. **3**A and **3**B, or as has been described in relation to FIGS. **4**A and **4**B, for instance.

The purging insert **204** is thereafter used to deliver the pressurized fluid to the desired fluid-jet printhead to purge this printhead (**506**). Again, this may be achieved in relation to FIGS. **3**A and **3**B, or as has been described in relation to FIGS. **4**A and **4**B, for instance. In some embodiments, the waste collection mechanism **210** can be used to collect the

waste resulting from purging of the desired fluid-jet printhead (**508**), as has been specifically described in detail in relation to FIGS. **3**A and **3**B, but which may also be employed in relation to the embodiment described in relation to FIGS. **4**A and **4**B above.

We claim:

1. An apparatus to selectively purge a desired fluid-jet printhead of a plurality of fluid jet printheads of a page-wide array fluid jet device, comprising:

a purging insert completely and movably locatable within a fluid channel of the page-wide array fluid jet device, the fluid channel to supply fluid to the fluid jet printheads during normal operation of the page-wide array fluid jet device in which the fluid is selectively ejected from the fluid jet printheads in accordance with a desired image;

a movement mechanism operatively coupled to the purging insert to move the purging insert within the fluid channel incident to just the desired fluid jet printhead and not incident to the fluid jet printheads other than the desired fluid jet printhead; and,

a pressurizing mechanism fluidically coupled to the purging insert to pressurize fluid, the purging insert to deliver the fluid as pressurized by the pressurizing mechanism to the desired fluid jet printhead to purge the desired fluid jet printhead.

2. The apparatus of claim **1**, wherein the purging insert comprises a cavity, and the fluid channel is separated from the desired fluid jet printhead by a wall having a secondary channel fluidically coupling the fluid channel to the desired fluid jet printhead,

wherein the movement mechanism is to move the purging insert within the fluid channel incident to the desired fluid jet printhead such that the cavity of the purging insert is fluidically coupled to the desired fluid jet printhead via the secondary channel.

3. The apparatus of claim **1**, wherein the movement mechanism comprises:

a carriage section movably disposed on an exterior of the fluid channel;

a ferromagnetic member movably disposed within the fluid channel incident to the carriage section and attached to the purging insert; and,

a direct current (DC) coil wound around the carriage section, the DC coil inductively coupled to the ferromagnetic member upon powering of the DC coil such that movement of the carriage section over the exterior of the fluid channel is to cause corresponding movement of the purging insert within the fluid channel.

4. The apparatus of claim **3**, wherein the movement mechanism further comprises a motor to move the carriage section over the exterior of the fluid channel.

5. The apparatus of claim **1**, wherein the pressurizing mechanism is disposed within the insert and comprises:

a cavity;

one or more inlet valves fluidically coupling the fluid channel with the cavity to move fluid from the fluid channel to the cavity;

a piston to pressurize the fluid within the cavity; and,

an outlet valve fluidically coupling the cavity to the desired fluid-jet printhead to move the fluid as pressurized by the piston within the cavity to the desired fluid jet printhead.

6. The apparatus of claim **5**, wherein the pressurizing mechanism further comprises:

a carriage section movably disposed on an exterior of the fluid channel; and,

an alternating current (AC) coil wound around the carriage section, the AC coil electromagnetically coupled to the piston upon powering of the AC coil such that the piston is caused to oscillate within the cavity to pressurize the fluid within the cavity.

7. The apparatus of claim **1**, further comprising a waste collection mechanism movably disposed over an exterior of the fluid channel to collect waste resulting from purging of the desired fluid jet printhead,

wherein the movement mechanism is further operatively coupled to the waste collection mechanism to move the waste collection mechanism over the exterior of the fluid channel incident to the desired fluid jet printhead.

8. The apparatus of claim **1**, wherein the movement mechanism comprises:

one or more rotatable pulley wheels; and,

a flexible hollow tubing disposed around the rotatable pulley wheels and fixably attached to and fluidically coupled to the purging insert within the fluid channel,

wherein rotation of the rotatable pulley wheels is to cause movement of the flexible hollow tubing disposed around the rotatable pulley wheels to result in movement of the purging insert within the fluid channel.

9. The apparatus of claim **8**, wherein the movement mechanism further comprises a motor to rotate at least one of the rotatable pulley wheels.

10. The apparatus of claim **1**, wherein the pressurizing mechanism comprises:

a pump to pressurize the fluid; and,

a flexible hollow tubing fluidically coupling the pump and the purging insert within the fluid channel to deliver the fluid as pressurized from the pump to the purging insert.

11. A page-wide-array fluid jet device comprising:

a plurality of fluid jet printheads organized in a page-wide array at least substantially perpendicular to a direction of movement of media within the fluid-jet device;

a fluid channel to supply fluid to the fluid-jet printheads during normal operation of the fluid jet device; and,

a purging component to selectively purge a desired fluid-jet printhead of the fluid jet printheads, comprising:

a purging insert movably locatable within the fluid channel;

a movement mechanism operatively coupled to the purging insert to move the purging insert within the fluid channel incident to the desired fluid-jet printhead; and,

a pressurizing mechanism fluidically coupled to the purging insert to pressurize fluid, the purging insert to deliver the fluid as pressurized by the pressurizing mechanism to the desired fluid jet printhead to purge the desired fluid jet printhead.

12. The fluid jet device of claim **11**, wherein the purging insert comprises a cavity, and the fluid channel is separated from the desired fluid jet printhead by a wall having a secondary channel fluidically coupling the fluid channel to the desired fluid jet printhead,

wherein the movement mechanism is to move the purging insert within the fluid channel incident to the desired fluid jet printhead such that the cavity of the purging insert is fluidically coupled to the desired fluid jet printhead via the secondary channel.

13. The fluid jet device of claim **11**,

wherein the movement mechanism comprises:

a first carriage section movably disposed on an exterior of the fluid channel;

a ferromagnetic member movably disposed within the fluid channel incident to the first carriage section and attached to the purging insert; and,

a direct current (DC) coil wound around the first carriage section, the DC coil inductively coupled to the ferromagnetic member upon powering of the DC coil such that movement of the first carriage section over the exterior of the fluid channel is to cause corresponding movement of the purging insert within the fluid channel,

and wherein the pressurizing mechanism is disposed within the insert and comprises:

a cavity;

one or more inlet valves fluidically coupling the fluid channel with the cavity to move fluid from the fluid channel to the cavity;

a piston to pressurize the fluid within the cavity;

an outlet valve fluidically coupling the cavity to the desired fluid-jet printhead to move the fluid as pressurized by the piston within the cavity to the desired fluid jet printhead;

a second carriage section movably disposed on an exterior of the fluid channel; and,

an alternating current (AC) coil wound around the second carriage section, the AC coil electromagnetically coupled to the piston upon powering of the AC coil such that the piston is caused to oscillate within the cavity to pressurize the fluid within the cavity.

14. The fluid jet device of claim **11**,

wherein the movement mechanism comprises:

one or more rotatable pulley wheels; and,

a first flexible hollow tubing disposed around the rotatable pulley wheels and fixably attached to and fluidically coupled to the purging insert within the fluid channel,

where rotation of the rotatable pulley wheels is to cause movement of the first flexible hollow tubing disposed around the rotatable pulley wheels to result in movement of the purging insert within the fluid channel,

and wherein the pressurizing mechanism comprises:

a pump to pressurize the fluid; and,

a second flexible hollow tubing fluidically coupling the pump and the first flexible hollow tubing to deliver the fluid as pressurized from the pump to the purging insert.

15. A method for selectively purging a desired fluid-jet printhead of a plurality of fluid jet printheads of a page-wide array fluid jet device, comprising:

using a movement mechanism operatively coupled to a purging insert completely and movably locatable within a fluid channel of the page-wide array fluid jet device to move the purging insert within the fluid channel incident to just the desired fluid jet printhead and not incident to the fluid jet printheads other than the desired fluid jet printhead, the fluid channel to supply fluid to the fluid jet printheads during normal operation of the page-wide array fluid-jet device in which the fluid is selectively ejected from the fluid jet printheads in accordance with an image;

using a pressurizing mechanism fluidically coupled to the purging insert to pressurize fluid; and,

using the purging insert to deliver the fluid as pressurized to the desired fluid jet printhead to purge the desired fluid jet printhead.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,157,361 B2
APPLICATION NO. : 12/348304
DATED : April 17, 2012
INVENTOR(S) : Chen Turkenitz et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 9, line 8, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 9, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 11, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 12, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 13, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 15, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 18, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 19, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 20, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 24, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, lines 24-25, in Claim 1, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 28, in Claim 2, delete ““fluid jet” and insert -- fluid-jet -- therefor.

In column 9, lines 29-30, in Claim 2, delete “fluid jet”” and insert -- fluid-jet --, therefor.

In column 9, line 33, in Claim 2, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 9, line 34, in Claim 2, delete “fluid jet” and insert -- fluid-jet --, therefor.

Signed and Sealed this
Twenty-seventh Day of November, 2012

David J. Kappos

David J. Kappos
Director of the United States Patent and Trademark Office

In column 9, line 61, in Claim 5, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 7, in Claim 7, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 11, in Claim 7, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 32, in Claim 11, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 33, in Claim 11, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 37, in Claim 11, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 39, in Claim 11, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 49, in Claim 11, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 50, in Claim 11, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 51, in Claim 12, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 53, in Claim 12, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 55, in Claim 12, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 58, in Claim 12, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 59, in Claim 12, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 10, line 61, in Claim 13, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 11, line 18, in Claim 13, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 11, line 26, in Claim 14, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 12, line 1, in Claim 14, delete “where” and insert -- wherein --, therefor.

In column 12, line 12, in Claim 15, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 12, line 13, in Claim 15, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 12, line 16, in Claim 15, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 12, line 18, in Claim 15, delete “fluid jet” and insert -- fluid-jet --, therefor.

In column 12, line 19, in Claim 15, after "the" delete "fluid jet" and insert -- fluid-jet --, therefor.

In column 12, line 19, in Claim 15, after "desired" delete "fluid jet" and insert -- fluid-jet --, therefor.

In column 12, line 20, in Claim 15, delete "fluid jet" and insert -- fluid-jet --, therefor.

In column 12, line 23, in Claim 15, delete "fluid jet" and insert -- fluid-jet --, therefor.

In column 12, line 28, in Claim 15, delete "fluid jet" and insert -- fluid-jet --, therefor.

In column 12, lines 28-29, in Claim 15, delete "fluid jet" and insert -- fluid-jet --, therefor.